

## THE RELATIONSHIP BETWEEN PMO SUPPORT FUNCTIONS AND PROJECT MANAGEMENT MATURITY LEVELS: A CASE STUDY OF A SOUTH AFRICAN PETROCHEMICAL COMPANY

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### ABSTRACT

This paper identifies the essential support functions of project management offices (PMO) for various organisational project management maturity (OPMM) levels. A case study of a South African petrochemical company compares a PMO within the company with a small projects department that is not supported by a PMO. OPMM development drivers and essential PMO support functions are identified for both structures. It is proposed that the requirements of essential PMO support functions depend on the OPMM level, but are also affected by business needs. The highest OPMM level is not required for every organisation, as the optimum OPMM level depends on the specific business' requirements.

### OPSOMMING

Hierdie artikel identifiseer noodsaaklike ondersteuningsfunksies van projekbestuurskantore (PBKe) vir verskillende vlakke van organisatoriese projekbestuur-volwassenheid. 'n Gevalstudie vergelyk 'n PBK en 'n klein projekte departement van 'n Suid-Afrikaanse petrochemiese maatskappy. Die ontwikkelingsdrywers van organisatoriese projekbestuur-volwassenheid en noodsaaklike PBK ondersteuningsfunksies is vir beide strukture geïdentifiseer. Dit blyk dat die noodsaaklike PBK-funksies afhang van die vlak van organisatoriese projekbestuur-volwassenheid, maar ook beïnvloed word deur besigheidsbehoefte. Die optimale vlak van organisatoriese projekbestuur-volwassenheid hang af van spesifieke besigheidsvereistes, en vereis nie noodwendig die hoogste vlak van organisatoriese projekbestuur-volwassenheid nie.

## 1. INTRODUCTION

Project management offices (PMOs) assist in managing various projects simultaneously [1]. Project-based organisations (PBOs) that value project management (PM) as part of their business have implemented PMOs since the 1990s [2, 3, 4]. PMO structures and functions depend on organisational needs [5], and PMO mandates therefore differ significantly between PBOs [6]. Although PMOs differ, their main goal is to provide support functions. Improving such functions is likely to increase project performance [7].

PMOs frequently change, and it is believed that PMOs do so as organisational project management maturity (OPMM) develops [3]. Higher OPMM levels result in the PMO adding increased PM competency and greater value [8]. PBOs will have a strategic advantage at higher OPMM levels, but only when their OPMM level is higher than that of their competitors [9]. Therefore, PBOs must identify their OPMM levels and develop their PM methodologies accordingly. Most PBOs do not have a strategy to promote the development of their OPMM [10], and so PBOs need to understand how to structure their PMOs in order to develop their OPMM [11].

Project management maturity models (P3Ms) assist PBOs to determine their OPMM levels [12]. However, no guideline exists that links PMO support functions to OPMM levels. PBOs struggle to identify the required essential PMO support functions, given their OPMM levels, and to increase their PMOs' success by structuring

them around these functions. Providing essential PMO support functions would assist OPMM development. This study aimed to address this need by identifying the essential PMO support functions that are required at the various OPMM levels.

A case study was conducted on a South African petrochemical company’s PMO, which supports mega- and large projects, and on a small projects department that is not supported by a PMO. The study regarded both structures (the PMO and the small projects department) as separate PBOs.

Based on a literature review, a PMO support function framework was developed to assist in identifying the essential PMO support functions of these two PBOs. By identifying the essential PMO support functions, the study builds on theory regarding the essential PMO support functions that are required for each OPMM level. This could assist PBOs to set up their PMOs, based on their respective OPMM levels, to increase their PMO success and to develop appropriate OPMM levels. The drivers of essential PMO support functions are identified; but, as PMOs normally only exist in organisations that are at least at OPMM level 2, no data was captured for OPMM level 1. The study therefore only deals with OPMM levels 2 to 5.

The objectives were:

- To investigate the OPMM development drivers of PBOs;
- To identify the PMO support functions provided in organisational structures of various OPMM levels; and
- To identify the essential PMO support functions that are required for each OPMM level.

## 2. LITERATURE REVIEW

### 2.1. Concept of PMOs

The Project Management Institute (PMI) [5] defines a PMO as “an organisational structure that standardises the project-related governance processes and facilitates the sharing of resources, methodologies, tools and techniques”. Dai and Wells [4] add that a PMO is an organisational structure that provides PM principles, methodologies, practices, tools, and techniques to project managers, teams, and functional departments to ensure effective PM in the organisation. It is commonly accepted that PMOs offer value by providing these functions. However, no consensus exists on whether PMOs actually do add value, as it is difficult to measure [1, 13, 14, 15]. How PMOs and their functions should be set up needs to be understood in order to ensure that maximum value is created [1, 8, 13, 15].

### 2.2. PMO support functions

PMO support functions identified from the literature correlate between various studies, confirming that certain PMO support functions are required from all PMOs, regardless of industry or PMO setup. Eleven categories comprising 84 PMO support functions are identified from the literature, and are shown in Table 1.

**Table 1: PMO support functions identified from the literature**

PMO support function category	PMO support functions	References
PM governance	Provide PM organisation and structure.	[5, 6, 16, 17, 18, 19, 20]
	Develop and provide all organisational PM governance.	
	Develop and define organisational PM standards, methodologies, processes, best practices, models, and metrics.	
	Provide support on PM organisational standard, methodologies, processes, best practices, models, and metrics.	
	Update PM organisational standards, methodologies, processes, best practices, models, and metrics.	
	Benchmark PM best practices.	
	Provide change management procedures.	
	Provide project implementation control measures.	

PMO support function category	PMO support functions	References
	Provide schedule management procedures and structures.	
	Develop and provide effective PM tools.	
	Provide project administration support and documentation management.	
	Provide commercial management.	
	Support agility through proactive governance.	
Procedure enforcement	Monitor and coordinate projects.	[6, 18, 20]
	Conduct PM compliance audits on procedures, standards, policies, and models.	
	Provide feedback on project audits.	
	Ensure best practice adherence.	
	Assess PM infrastructure use.	
	Monitor compliance of PM document templates.	
Project performance evaluation	Monitor project performance.	[6, 11, 17, 18, 20]
	Conduct project performance evaluations.	
	Assist change management.	
	Assist scope management.	
	Monitor project budgets.	
	Assist project recovery management.	
	Assist project close-out management.	
	Track project benefit realised.	
	Conduct post-project delivery review.	
Risk management	Identify potential project problems.	[16, 18, 20]
	Implement a risk database.	
	Assist with risk management.	
	Assist with crisis management.	
Quality management	Provide and enforce quality management procedures.	[16, 17, 20]
	Ensure consistent quality of services or products delivered.	
	Improve quality standards.	
Communication management	Provide efficient communication management procedures.	[16, 17, 20]
	Provide flexible operating models and new technology to improve communication.	
	Ensure communication management across projects.	
	Provide a centralised project reporting platform.	
	Facilitate project reporting.	
New technology management	Implement new technologies improving project performance.	[17, 18, 19]
	Provide platforms with real-time project data.	
	Ensure easy access to project data.	
	Ensure that PM information is available on the cloud.	
	Integrate data platforms and data security.	
	Develop, select, provide, and manage PM software.	
Knowledge transfer	Provide facilities and equipment support.	[5, 6, 17, 18, 20]
	Coordinate data sourcing and collaboration throughout project teams.	
	Consolidate data and report to governing body.	
	Implement PM information repository.	
	Provide database of best practices.	
	Develop and maintain PM archives.	
	Compile, document, and manage lessons learned.	
	Integrate PM knowledge derived from previous projects.	
	Facilitate effective knowledge transfer between projects.	
Manage knowledge transfer.		
Provide specialist PM knowledge and information.		

PMO support function category	PMO support functions	References
Strategic business alignment	Develop initiatives into projects aligned with business strategy.	[6, 11, 16, 17, 18, 20]
	Ensure strategic planning of projects to align with business strategy.	
	Measure business performance and re-evaluate necessity of planned and executed projects.	
	Select projects that ensure strategic growth.	
	Implement a formalised project selection process.	
	Ensure integration between project initiatives.	
	Provide clear vision and mission for projects.	
	Provide agile culture supporting adaptability and collaboration of stakeholders.	
	Measure project performance with agile metrics.	
	Manage interfaces and relationships with clients, contractors, vendors, and suppliers.	
	Manage project portfolios.	
	Monitor project status and report to management.	
	Develop PM culture in the organisation.	
	Apply continuous PM improvement strategies.	
Resource allocation	Provide budget management procedures.	[6, 16, 17, 18, 20]
	Develop and govern PM HR.	
	Provide assigning procedure of project teams to projects.	
	Ensure efficient PM function distribution to project team members.	
	Obtain professional expertise for required projects.	
	Optimise, allocate, and monitor shared resource distribution among projects.	
Training and mentoring	Monitor resource effectiveness and productivity.	[6, 11, 17, 18, 20]
	Provide PM competency and skills education and training.	
	Develop and facilitate coaching and mentoring.	
	Provide guidance, advice, and supervision.	
	Provide PM standards, procedures, and best-practice education and training.	
Provide consultation to projects.		
Develop staff and assist with career development.		

### 2.3. PMO development

PMOs change frequently [3], and often do not have a long lifespan [21]. They constantly evolve to adapt to industry changes and to new methodologies and principles [21]. These changes are driven by the internal and dynamic changes in PBOs [3]. PMOs' unstable and changing nature could be why they are not seen to deliver value [15]. However, most authors link the changing nature of PMOs to the positive effects of the value that PMOs add.

When PBOs evolve, they mature in the services and products they offer [1]. PMOs provide less value when they do not advance with the PBOs that they serve [20]. PMO functions must change to ensure stakeholder satisfaction [22]. When PMOs transform, they assist PBOs to develop to higher OPMM levels [3]. The changes in PMOs may therefore be attributed to the OPMM development of PBOs, resulting in higher value being added [6]. A conclusion is drawn that the support functions of PMOs will change as the maturity of the PBOs they serve evolves. Understanding the development of PMOs' support functions with regard to OPMM will assist PBOs to set up their PMOs effectively [8, 22].

### 2.4. Organisational project management maturity

Khalema, Van Waveren and Chan [10] define OPMM as an ideal condition of an organisation to deal with its projects. ARES Prism [23] defines OPMM as "the progressive improvement and development of an organisation's project management approach, methodology, processes and systems". It can be stated that

OPMM refers to a PBO's ability to filter through projects, select the ones that are aligned with the strategic business goals, and manage them effectively to meet the goals [16].

OPMM develops by improving existing and introducing new PMO functions [9, 24]. Increased OPMM results in increased PMO competency, added value, and project success [8, 25, 26]. It is also argued that an increased OPMM does not necessarily result in higher project success, as success depends on various factors. OPMM is seen, rather, as a measurement of a PBO's explicit, measurable PM knowledge [9].

## 2.5. Project management maturity models

Project management maturity models (P3Ms) are defined as tools that measure how developed an organisation's PM techniques are and how its PMO is integrated into the organisational management structure [12]. The roles of P3Ms are described by Torres [27] as follows:

- Assess the current OPMM of PBOs;
- Provide guidelines to PBOs on reaching higher OPMM levels; and
- Act as a benchmarking tool against other PBOs.

The most often used P3Ms are Kerzner's maturity model, Berkeley's OPMM model, and the PMI's organisational project management maturity model (OPM3) [10, 16, 28]. The models share the principle of moving from a low OPMM level to a high OPMM level through three to five levels [16]. At the lower OPMM levels, the focus is on standardising common PM practices and standards. A set methodology is achieved at the intermediate OPMM levels. The focus shifts to benchmarking and continuous improvement at the higher OPMM levels [16, 25, 29].

The P3Ms reviewed here do not provide comprehensive lists of the essential PMO support functions that are required at each OPMM level, nor list the essential PMO support functions that will develop OPMM.

## 3. CONCEPTUAL METHOD

The problem statement for this study was formulated as follows:

*PBOs struggle to identify the essential PMO support functions that are required at their specific OPMM levels and to structure PMOs around these essential functions in order to increase project success and improve their OPMM levels.*

The following research questions were formulated to address the research objectives:

- RQ1: According to a five-level maturity model, what are the PBOs' OPMM levels, and what are the drivers behind OPMM development?
- RQ2: What exactly are the PMO support functions that are provided at each OPMM level?
- RQ3: Which specific PMO support functions are deemed essential for PBOs in each OPMM level?

### 3.1. Organisational project management maturity framework

The OPMM framework shown in Table 2 was developed from the literature to ease the identification of a PBO's OPMM level and to answer the first research question. Most P3Ms consist of five levels [16, 26]; therefore, it is sufficient for the framework to consist of five OPMM levels. This table includes the PBO-, PMO-, and project characteristics identified from the literature.

Table 2: OPMM research framework set up from the literature

OPMM level	PBO characteristics	PMO characteristics	Project characteristics
1	<ul style="list-style-type: none"> <li>• Need for PM identified.</li> <li>• Need for common PM language [29].</li> </ul>	<ul style="list-style-type: none"> <li>• Supports one project.</li> <li>• One project manager.</li> <li>• Focused on basic PM deliverables - cost, scope, and schedule [30].</li> </ul>	<ul style="list-style-type: none"> <li>• No standard PM process or methodology [31].</li> <li>• Reactive and 'hero driven'.</li> <li>• Numerous challenges [29].</li> </ul>
2	<ul style="list-style-type: none"> <li>• Basic PM processes implemented [32].</li> <li>• Need for PM and support PMO development realised [29].</li> </ul>	<ul style="list-style-type: none"> <li>• Provides standard PM methodology [30].</li> <li>• No PM governance provided [31].</li> <li>• Supports multiple projects.</li> <li>• Multiple project managers.</li> <li>• Some PMO support staff.</li> <li>• Could include a programme manager [30].</li> </ul>	<ul style="list-style-type: none"> <li>• Basic PM practices and methodologies followed.</li> <li>• Common PM language used [29].</li> <li>• Time and cost management [30].</li> </ul>
3	<ul style="list-style-type: none"> <li>• Standard organisational PM methodology [32].</li> <li>• PM practices are integrated into organisational PM standard [29].</li> <li>• PBOs have clear orientation and collect data on PM [31].</li> </ul>	<ul style="list-style-type: none"> <li>• Central point of PM governance and control.</li> <li>• Established capability to govern and support projects [29].</li> <li>• Provides PM infrastructure.</li> <li>• Supports multiple projects [33].</li> <li>• Multiple project managers.</li> <li>• Some programme managers.</li> <li>• Full- and part-time PMO support staff [30].</li> </ul>	<ul style="list-style-type: none"> <li>• Adherence to organisational PM methodology [31].</li> <li>• Adherence to organisational PM standard [33].</li> <li>• All project managers and project team members apply the standard PM methodology and standard [29].</li> </ul>
4	<ul style="list-style-type: none"> <li>• Focused on developing all PM knowledge areas into the PM processes [29].</li> <li>• Comprehensive standard organisational PM methodology exists.</li> <li>• PM practices are integrated into comprehensive organisational PM standard [32].</li> <li>• Aligns projects with business objectives [33].</li> </ul>	<ul style="list-style-type: none"> <li>• Central PM governance body in the organisation.</li> <li>• Reports on all projects [24].</li> <li>• Enforces organisational PM standard [33].</li> <li>• Aligns PM capabilities with business objectives.</li> <li>• Supports multiple projects.</li> <li>• Multiple project managers.</li> <li>• Multiple programme managers.</li> <li>• PMO manager.</li> <li>• Full-time technical and support staff [30].</li> </ul>	<ul style="list-style-type: none"> <li>• Most projects align with organisational strategies.</li> <li>• All projects apply organisational PM methodology and standard [24].</li> <li>• All project managers and project team members adhere to the organisational PM standard.</li> <li>• Project managers and team members understand need to align with business objectives [29].</li> </ul>

OPMM level	PBO characteristics	PMO characteristics	Project characteristics
5	<ul style="list-style-type: none"> <li>• Focused on continuous improvement of organisational PM methodology and standard [29].</li> <li>• Focused on organisational competitiveness.</li> <li>• Benchmarks against competitors and PM methodologies and standards [24].</li> </ul>	<ul style="list-style-type: none"> <li>• Improves OPMM through improving PM methodology and standard.</li> <li>• Manages and drives continuous improvement [31].</li> <li>• Manages interdepartmental collaboration to achieve business goals [29].</li> <li>• Multiple projects, programmes, and portfolios.</li> <li>• Reports to an executive manager.</li> <li>• Full-time technical PMO staff.</li> <li>• Organisation-wide support staff [30].</li> </ul>	<ul style="list-style-type: none"> <li>• Objectives are to improve organisational competitiveness.</li> <li>• All projects are aligned with organisational strategies [31].</li> <li>• All projects work to improve PM methodology and standard.</li> <li>• All project managers and project team members focus on improving PM methodology and standard [32].</li> <li>• Project managers and project team members understand need to align with business objectives [29].</li> </ul>

### 3.2. PMO support function framework

The PMO support functions shown in Table 1 assisted with identifying the PMO support functions that are provided at each OPMM level. The PMO support functions identified for both PBOs were tabulated. The essential PMO support functions OPMM level were identified from, but not limited to, the provided PMO support functions that were identified. The essential PMO support functions identified for each OPMM level were counted, and the functions with the highest counts were selected as the ‘essential’ PMO support functions.

## 4. RESEARCH METHOD

The study aimed to identify a pattern of OPMM development drivers and essential PMO support functions in order to build theory about the essential PMO support functions that are required at each OPMM level.

### 4.1. Research design

The selected research design was a case study. Case studies are used in organisational contexts when research is done on a small scale [34, 35]. Case studies are also used to create theoretical insights into a phenomenon rather than to test hypotheses [36].

### 4.2. Case selection

A South African petrochemical company was studied with a focus on the company’s PMO and small projects department. The PMO reports to a projects business unit (BU), while small projects reports to an operations BU. For the purposes of this study, these two structures are considered as separate PBOs. The difference between them lies in the types of projects that are executed. Company-wide projects are categorised according to complexity, business risk, and expected capital expenditure. Mega-projects are the highest-ranked projects, followed by Class 1 to 5 projects. The PMO focuses on mega- and large (Class 1 to 4) projects, and must follow all PM governance policies in their execution. Because of limited resources to execute projects with elaborate methodologies, the small projects department focuses solely on Class 5 projects that are non-complex and that have low business risks and low capital expenditure. They are motivated by operational impacts, and are expected to be executed rapidly.

### 4.3. Data-gathering methods

A qualitative data-gathering approach was followed, as the data from the data-gathering methods was mostly qualitative. The following data-gathering methods were used:

- A total of nine semi-structured interviews were conducted. As indicated in Table 3, six were from the PMO and three from the small projects department. The six had an average of 19 years' experience and a combined experience of 111 years, while the had an average of 20 years' experience and combined experience of 61 years;
- Twelve internal company PM related documents reviewed; and
- A total of 19 responses were obtained from structured surveys. As indicted in Table 3, 14 of these respondents were from the PMO and 5 from small projects. The 14 respondents had an average of 18 years' experience and a combined 251 years' experience. The 5 respondents had an average of 11 years' and a combined 57 years' experience.

### 4.4. Data Analysis

Data analysis for multiple case studies entails inter-case and cross-case analyses [37]. This approach was followed as the case study compare two PBOs within the same company.

The data from the interviews were analysed with computer assisted qualitative data analysis software (CAQDAS).

#### 4.4.1. Inter-PBO analysis

The collected data was compared with the OPMM research framework to classify each PBO at an OPMM level. Based on the outcome, the OPMM development drivers were identified. The analysed OPMM level data was combined with the essential PMO support functions data, and that was analysed to identify any essential PMO support functions for each OPMM level for each PBO.

#### 4.4.2. Cross-PBO analysis

The inter-PBO analyses were compared in order to identify a pattern in the OPMM development drivers, OPMM levels, and essential PMO support functions required for each OPMM level. The data was analysed to determine how the PBOs developed and whether it correlated between the PBOs. The same was done to determine whether there was a correlating pattern exists between the OPMM level and essential PMO support functions required for the PBOs.

## 5. RESULTS

### 5.1. OPMM level & development

Respondents of the semi-structured interviews and structured surveys were requested to identify the OPMM level of their PBO, based on the OPMM research framework's PMO, PBO, and project characteristics as shown in Table 2. Table 3 shows the OPMM level classifications obtained for each PBO from the semi-structured interviews and structured surveys.

**Table 3: OPMM level classification of the PBOs, based on the numbers of interview and survey respondents**

OPMM level	PMO interview respondents	PMO survey respondents	Small projects interview respondents	Small projects survey respondents
1	-	-	-	-
2	-	-	2	4
3	1	4	1	1
4	5	7	-	-
5	-	3	-	-
Total respondents	6	14	3	5



Based on the definition of the maturity levels and the information provided by the respondents, the overall OPMM levels were classified as OPMM levels 4 and 2 for the PMO and the small projects respectively. These OPMM levels were selected because the majority of the respondents classified their PBOs at these maturity levels. Some traits are classified within OPMM levels 3 and 5 and within OPMM level 3 for the PMO and the small projects respectively. This suggests that a PBO will be at a certain OPMM level, but that it is possible to have traits within lower or higher OPMM levels. It confirms Nicholas and Steyn’s [9] suggestion that PBOs do not need to have the same OPMM level across all PM knowledge areas.

### 5.1.1. Main OPMM development drivers

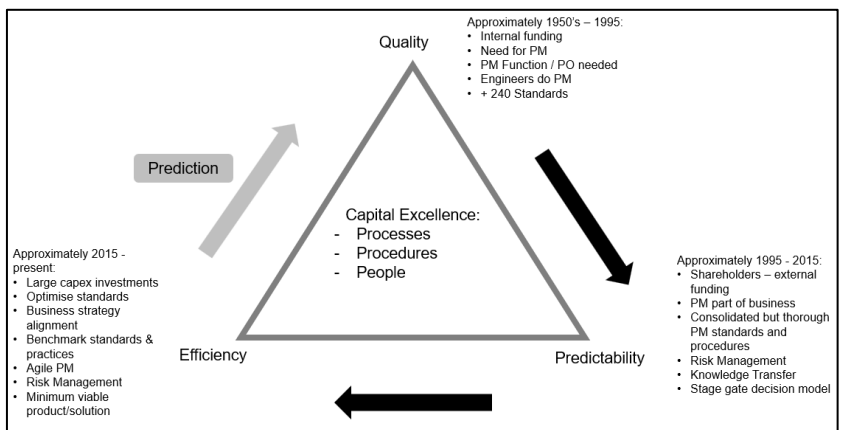
Table 4 shows the main OPMM development drivers that were determined for each OPMM level from the cross-PBO analysis of the PMO and small projects semi-structured interviews. The focus of PMOs shift from PM need and PM quality at OPMM levels 1 and 2 to PM predictability at OPMM level 3, PM efficiency and business strategy at OPMM level 4 and continuous PM improvement and business competitiveness at OPMM level 5. The results are aligned with the OPM3.

**Table 4: Main OPMM development drivers per OPMM level as selected by semi-structured interview respondents.**

OPMM Level	Main development drivers	Number of Respondents
1	PM process need	3
	Reliance on Projects	2
2	Business changes/need	3
	Reliance on Projects	3
3	PM Standardisation	5
	Business changes/need	4
	Project Repeatability	3
4	Business Strategy	4
	Agile PM Governance	3
5	Business competitiveness	3
	Improved PM effectiveness	3
	Agile PM governance	3

### 5.1.2. Document review

Twelve internal company PM- and PMO-related documents were reviewed to determine how the total company’s OPMM had developed. Figure 1 shows a summary of how the company’s OPMM developed over time.



**Figure 1: Total OPMM development, from internal document reviews**

The company followed the general OPMM development noted in the literature. The OPMM development drivers are summarised as follows:

1. PM needs to ensure quality;
2. Predictability through PM standards;
3. Efficiency through benchmarking and optimisation of PM standards; and
4. Efficiency through continuous improvement of PM practices.

An interviewee predicted that the focus would shift back to quality within the next 10 to 20 years. This would be owing to a decline in quality resulting from a greater focus on agility without due diligence.

### **5.1.3. OPMM Level 5 requirement**

The researcher raised a question prior to the data-gathering: whether each PBO should develop to OPMM level 5. Nineteen of the 28 study participants indicated that the development of a PBO to OPMM level 5 is not necessarily required. It was reasoned that PBOs must determine their own reliance on projects and their need for OPMM development. It was suggested that organisations with low OPMM levels and a low reliance on projects should outsource PM activities to PBOs with high OPMM levels.

The main reasons recorded for not developing to OPMM level 5 were:

- It is expensive to obtain and maintain;
- It results in high overhead costs;
- High overhead costs reduce business competitiveness of organisations with limited resources;
- It depends on business reliance on projects; and
- It depends on business strategy.

Nine participants indicated that a PBO must develop to OPMM level 5m but noted that development is dependent on resource constraints and other external factors. The main reason provided for the need to develop to OPMM level 5 is that increased OPMM would increase successful project management and PMO support. This correlates with the reason given in the literature where it is believed that increased OPMM would increase project success [8, 24, 27, 39].

It was concluded that, in theory, a high OPMM level increases project and business success, but that is not required for each PBO. OPMM level requirements are dependent on factors such as resource constraints, the nature of the business and its reliance on projects. This supports Nicholas and Steyn's [9] argument that high OPMM does not necessarily result in higher project success and that PBOs would only have a strategic advantage when the OPMM is higher than that of their competitors. PBOs should define their required OPMM level prior to setting up their PM concepts and PMOs.

### **5.2. PMO support functions provided**

Only data for the PMO was recorded, as small projects did not have a PMO. The PMO provided data only on OPMM levels 3 to 5, and concluded that all the PMO support functions listed in Table 1 are provided at these OPMM levels. The study opted to identify the main PMO support function categories for each OPMM level. The main PMO support function categories for OPMM levels 3 to 5 are shown in Table 5.

The PMO support function categories, and in turn the PMO support functions provided, were not necessarily aligned with the OPMM development drivers identified for OPMM levels 3 to 5. This may be owing to the constantly changing nature of PMOs [21, 7] to adapt to business needs. It was noted that the company recently finalised a restructuring in which the structure of the business departments and the PMO changed. The PMO therefore had to re-address items that were in place prior to the restructuring. The difference between the OPMM development drivers and PMO support function categories provided may also be because the OPMM vary between levels 3 and 5.

**Table 5: Main PMO support function categories at OPMM levels 3 to 5m**

	<b>OPMM Level 3</b>	<b>OPMM Level 4</b>	<b>OPMM Level 5</b>
Main PMO support function categories provided	Procedure enforcement	Risk management	Training & mentoring
	Risk management	PM governance	Risk Management
	Quality management	Project performance evaluation & rescue	Quality management
	PM governance	Quality management	Procedure enforcement
	Knowledge transfer	Training & mentoring	PM governance

Inter-PBO essential PMO support functions

Table 6 shows the essential PMO support functions and main focus areas identified for OPMM levels 3 to 5 from the PMO semi-structured interviews and structured surveys. At OPMM level 3m the main focus area is procedure enforcement, which links to the development drivers of this level namely PM standardisation and project repeatability. The essential PMO support functions listed are in line with the expected OPMM level 3 focus area of project predictability. At OPMM level 4 the main focus area is procedure enforcement which is not directly linked to the development drivers of this level, namely business strategy and agile PM governance. It also does not link to the focus area of efficient PM, which is expected at this level. This deviation may be because of a change in work methodology resulting from the restructuring.

At OPMM level 5m the main focus area is training and mentoring. This links partly to one of the development drivers for this level namely improve PM effectiveness. To some extent it can be linked to the focus area of efficient PM, which is expected at this level.

**Table 6: Essential PMO support functions required at OPMM levels 3 to 5**

<b>OPMM level</b>	<b>Essential PMO support function</b>	<b>Count</b>	<b>Total respondents</b>	<b>Main focus areas</b>
3	Monitor project performance.	5	5	Performance evaluation
	Ensure best practice adherence.	4		
	Identify potential project problems.	4		
	Provide and enforce quality management procedures.	4		
4	Conduct PM compliance audits on procedures, standards, policies, and models.	9	12	Procedure enforcement
	Develop and provide effective PM tools.	8		
	Ensure consistent quality of services or products delivered.	8		
	Provide PM standards, procedures, and best practice education and training.	8		
5	Provide PM competency and skills education and training.	3	3	Training & mentoring
	Develop and facilitate coaching and mentoring.	3		
	Provide guidance, advice, and supervision.	3		
	Provide PM standards, procedures, and best practice education and training.	3		
	Develop staff and assist with career development.	3		

Conclusive results were only obtained for OPMM level 2 in the small projects semi-structured interview and the structured survey data. Table 7 shows the essential PMO support functions and the main focus areas identified.

**Table 7: Essential PMO support functions required at OPMM level 2**

OPMM level	Essential PMO support function	Count	Total respondents	Main focus areas
2	Conduct post-project delivery review.	4	6	Training & mentoring, strategic business alignment
	Develop, select, provide, and manage PM software.	4		
	Compile, document, and manage lessons learned.	4		
	Implement a formalised project selection process.	4		
	Provide agile culture supporting adaptability and collaboration of stakeholders.	4		
	Optimise, allocate, and monitor shared resource distribution among projects.	4		
	Provide PM competency and skills education and training.	4		
	Provide guidance, advice, and supervision.	4		
	Provide PM standards, procedures, and best practice education and training.	4		

The main focus areas for OPMM level 2 are training and mentoring, and strategic business alignment. Training and mentoring links to the OPMM development driver: reliance of the organisation on projects. If a PBO is reliant on projects, it could be argued that its human resources must be trained and developed in PM. The main focus area of strategic business alignment does not align with the OPMM development drivers expected at OPMM level 2, as it is expected at OPMM levels 4 and 5. Strategic business alignment could be explained from small projects’ business requirement: they ensure that only operational projects are executed that ensure the continuation and development of the business.

**5.3. Formulation of a proposition**

The inter-PBO analyses indicated that essential PMO support functions were aligned, to some extent, with the identified OPMM development drivers. The required essential PMO support functions seemed to be influenced by the specific PBO needs. The following proposition is thus derived:

- Essential PMO support functions are influenced by the OPMM level of the PBO, but will vary from the expected focus areas and OPMM development drivers, based on the specific PBO’s needs.

**5.4. Cross-PBO essential PMO support functions identified**

The cross-PBO analysis attempted to provide support for the proposition that essential PMO support functions are required for each OPMM level. No relevant data was recorded for OPMM level 1 and no changes were recorded for OPMM levels 2, 4, and 5 from the inter-PBO analysis. The essential PMO support functions required at OPMM level 3 remained the same. The only change was that all the participants who classified their PBO at OPMM level 3 selected the PMO support functions noted in Table 6, confirming that they are essential at OPMM level 3. It is concluded that essential PMO support functions change with developing OPMM; and this conclusion is confirmed by the literature [8, 24, 37].

To obtain a holistic view of the company, the essential PMO support functions, which represent about 50% of the highest counted essential PMO support functions that were identified for each OPMM level, were determined. Table 8 shows the main focus areas of these functions for OPMM levels 2 to 5.

**Table 8: Essential PMO support function focus areas for OPMM levels 2 to 5**

OPMM level	Main focus areas of essential PMO support functions
2	Pm governance
	Strategic business alignment
	Training and mentoring
3	Procedure enforcement
	Strategic business alignment
4	PM governance
	Project performance evaluation
5	Strategic business alignment
	Training and mentoring

The main focus areas of the essential PMO support functions did not align with the expected OPMM development drivers. The only correlation was that there was a need for PM governance. The main focus areas of the essential PMO support functions at OPMM level 3 were aligned, however, with the expected main development drivers for OPMM level 3.

The main focus areas of the essential PMO support functions required at OPMM level 4 partly aligned with the expected main OPMM development drivers. Or rather, they were aligned with the OPMM development drivers that were expected at OPMM level 3. This may be because some characteristics were classified at OPMM level 3 for the PMO.

The main focus areas of the essential PMO support functions required at OPMM level 5 aligned with the expected OPMM development drivers, but lacked an agile PM governance focus. It is interesting to note that training and mentoring was a main focus area at both OPMM levels 2 and 5. It makes sense to focus on training and mentoring at OPMM level 2, as this is where most PBOs decide to rely on projects and therefore need to train their human resources in the PM principles [1]. It also makes sense to focus on training and mentoring at OPMM level 5, as the development drivers identified in Table 4 show that a PBO will focus on business competitiveness and effective PM, thus on being more efficient and continuously improving. To be able to achieve this, the human resources need training and mentoring on all the latest best practices and standards to ensure that the PBO remains at OPMM level 5.

## 6. CONCLUSIONS AND RECOMMENDATIONS

From the results it is clear that specific PMO support functions are essential for each OPMM level, and that the support functions are aligned with the OPMM development drivers of each OPMM level. However, the functions are influenced by the internal needs of the PBO, resulting in a misalignment with the expected OPMM development drivers. The essential PMO support functions will tend to revert to the main OPMM development drivers of each OPMM level after the internal needs have been addressed. Essential PMO support functions are therefore dependent not only on the OPMM level but also on the business' needs.

This study's main goal was to identify the essential PMO support functions that are required at each OPMM level with the objective of assisting PBOs to set up their PMOs according to their OPMM levels. The literature indicated that PBOs need to understand how to set up their PMOs to develop their OPMM successfully. This was achieved for OPMM levels 2 to 5 for the PBOs concerned, as shown in Tables 6 to 8. It was noted, however, that most of the functions listed in Table 1 had to be present to some extent, and that the PBO had to determine its own requirements for its PMO. Tables 6 to 8 only provide a guideline to the main focus areas and to the related PMO support functions that were identified in this case study.

A case study was conducted on a South African petrochemical company by focusing on the company's PMO and small projects department, which were considered to be separate PBOs. The PMO's baseline OPMM level was level 4, but was found to vary between OPMM levels 3 and 5. Small projects had a baseline OPMM level of level 2, with some characteristics of OPMM level 3. The varying OPMM levels of the PBOs confirmed that PBOs may not have the same OPMM level in all PM knowledge areas because the varying business needs that must be addressed. It was concluded that not all PBOs have to develop to OPMM level 5, as it is

expensive to obtain and maintain. The required OPMM level must be determined by a PBO's business reliance on projects, business needs, and resource constraints.

The identified OPMM development drivers were aligned with the P3Ms that were reviewed. The drivers would shift from PM governance need, business reliance on projects, and project predictability at OPMM levels 1 to 3 to continuous PM improvement, business competitiveness, and agile PM at OPMM levels 4 to 5. It is suggested that specific PMO support functions are required at each OPMM level that are strongly influenced by the OPMM development drivers of each OPMM level. The essential PMO support functions are also affected by specific internal business needs that result in a misalignment of the PMO support functions with the OPMM development drivers.

It was concluded that business needs influence OPMM development needs in PBOs. The needs might require the development of additional PMO support functions that are not aligned with the OPMM development drivers. After meeting the needs, the essential PMO support functions will revert to the specific OPMM development drivers for each OPMM level.

In practice, this study's case organisation could benefit from the results by reviewing them and understanding the perceived OPMM levels of each PBO. Through understanding the OPMM level of each PBO, the organisation could decide whether this was in line with their business need and whether further OPMM level development was needed. The organisation could attend to the OPMM development drivers and implement the essential PMO support functions, which currently lack the required attention, as identified in this study. A recommendation is that the organisation integrate the small projects department into the PMO's BU. The small projects department needs to be enabled to conduct agile PM. However, this is difficult without the support of a PMO and with a OPMM level 2. This study identified that agile PM requires a PBO to have a OPMM level of at least 4. By combining the small projects department with the PMO, the small projects department gains access to the PMO support functions it lacks. The human resources would also gain access to mentors working at an OPMM level 4 and to more mature PM standards and processes. This would enable the small projects team (no longer a department, but a team in the PMO) to develop to OPMM level 4 and so execute agile projects better.

In practice, this study encourages PMO managers to identify the OPMM levels of the PBOs they serve and to align with senior management on the business needs and the OPMM level required to serve those needs. It also provides guidelines for aligning the essential PMO functions they provide at these levels, as well as the OPMM development drivers that must be attended to in order to promote OPMM growth.

The study's contribution to theory includes that it identified specific PMO support functions that are essential for PBOs at OPMM levels 2 to 5. The drivers behind the maturity levels of PBOs were also identified. This was done, however, for one organisation with two PBOs in its structure. Therefore, the theory should be tested and refined in further studies on other PBOs.

### **6.1. Study's limitations, and recommendations**

The study targeted participants from one South African petrochemical company. The results are based on the needs of this company, and may not be representative of other petrochemical companies. However, maturity models are also used in other environments [39], and the results of this study may not be applicable to other industries. Further research could include other South African or global petrochemical companies and companies from other industries.

This study compared a PMO with a non-PMO structure. The aim was to obtain data at low and high OPMM levels. The small projects department (the non-PMO structure) is relatively new, is still developing, and has resource constraints that may skew the data owing to its specific needs. Further research should target only PMOs for an accurate comparison.

The study was not concerned with an in-depth analysis of OPMM, but rather with the essential PMO support functions required at each OPMM level. Further research could investigate the effect of essential PMO support functions on value creation and their impact on OPMM development. The study suggests that essential PMO support functions are affected by OPMM levels and business needs. Further research should test the theory on various PBOs. Essential PMO support functions were aimed at projects as a whole. Future research could consider the different phases of projects to identify which PMO support functions are required in each project phase.

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